Cellulosic Nonwovens with improved performance: Learning from nature

Unlike synthetic fibers, cellulosic materials readily absorb water and are vulnerable to bacterial and microbial growth. These properties restrict their use in applications requiring water-repellency and antimicrobial properties. Thus it was very crucial to focus on enhancing the water-repellency and antimicrobial properties of cellulosic nonwovens to expand their utility across various fields and provide customers with more effective and environmentally friendly alternatives to synthetic options. The hydrophilic nature of cellulosic nonwovens is due to their porous structure and the presence of excessive hydroxyl groups on the structure of cellulose which makes it absorb and retain moisture and water. In conjunction with its moisture absorbance property, cellulose provides an organic composition that serves as a nutrient source for microorganisms that promotes microbial growth.

In our research, we contributed our expertise to functionalize cellulosic nonwovens in concrete terms by developing the water-repellency (as shown in the figure) and antimicrobial performance of bio-based cellulosic nonwovens while being inspired by Nature. The idea was to learn from nature and Bio-mimick what is in nature to improve the performance of cellulosic nonwovens. From creating rough like the surface of the lotus leaf, to extracting antimicrobial compounds from plants that use these compounds as self-defense mechanisms, we were able to learn from nature and solve this problem with our research.

A picture of a cellulosic nonwoven which is coated with a bio-based substance, displaying its water-repellent properties. The water droplets on the surface are colored for enhanced visibility. This cellulosic nonwoven was produced from bio-based and biodegradable materials, ensuring it returns to nature with minimal environmental impact.